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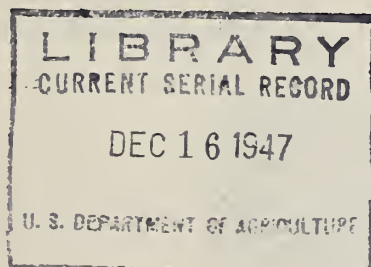


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# FARMING THAT FITS THE LAND



*in the* **LOESS-DRIFT HILLS  
OF NORTHEASTERN KANSAS**



IF YOU LIVE NORTH OF THE KAW AND EAST OF THE BLUE  
YOU WILL WANT TO READ THIS BOOK

U. S. DEPARTMENT OF AGRICULTURE  
Soil Conservation Service

## A WORD FROM YOUR NEIGHBOR

I'm a great believer in grass waterways for terraces. We cannot dump terraces in the roads. We must have waterways before we can build terraces.

**ELTON ALLEN,**

*Chairman, Board of Supervisors,  
Nemaha County Soil Conservation District,  
Soldier, Kans.*

Brown County needs more soil conservation. We need more grass, more gully control. We must all control the erosion on our own farm. Let's get the job done. Our local soil conservation men will help us with the jobs we can't do ourselves.

**GEORGE T. HAMILTON,**

*Chairman, Board of Supervisors,  
Brown County Soil Conservation District,  
Horton, Kans.*

We are only stewards of the soil. It must be saved for future generations. Contour cultivation helps save the soil and the moisture.

**P. F. DUBACH,**

*Chairman, Board of Supervisors,  
Doniphan County Soil Conservation District,  
Wathena, Kans.*

We were fighting a losing battle with soil erosion. We organized a soil conservation district. We have done a lot to save our soil. We still have a big job to do, but we are now on the right track. Working together we can stop soil erosion.

**FRED A. PRELL,**

*Chairman, Board of Supervisors,  
Marshall County Soil Conservation District,  
Bremen, Kans.*

You must establish good outlets before you build terraces if they are to be successful. We should have more well planned windbreaks. We can stop a lot of gullies with small check dams and brome grass.

**C. F. STUTZ,**

*Chairman, Board of Supervisors,  
Atchison County Soil Conservation District,  
Effingham, Kans.*





Sweetclover is the most used soil builder in your area. It also furnishes excellent pasture and produces good seed crops.

## FARMERS WORK TOGETHER TO SOLVE THEIR LAND PROBLEMS

If you live in this area you know that there are several kinds of land. Each kind has its own good and bad points. Usually there are one or more things you need to do to each kind to get the best crops. Many farmers in this area have found out the things that limit production or cause erosion and have done something about them. This booklet tells you the kinds of land and the crops that grow best on them, and how to handle or treat each kind of land so that you can save your soil.

People in this part of Kansas depend almost entirely on products from the farms. If you let the land run out, you suffer first but the businessmen suffer too. If you keep the good land good, you help not only yourself and your family but the whole community.

You will recognize these problems. All the farmers in northeastern Kansas must solve them in some way.

1. How to keep the soil fertile, so that it will produce good crops.
2. How to control erosion on sloping croplands and pastures.
3. How to save moisture for crops.
4. How to control gullies.
5. How to plan the farm so as to make good use of all the land.
6. How to control water along the roadside.

Farmers in the area began many years ago to work together toward solving their land problems. With the help of the county agents they adopted improved methods of production and marketing. Between 1935 and 1941 many farmers in Nemaha, Marshall, Jefferson, and Atchison Counties made use of technical help and labor offered by CCC camps and installed soil conservation practices. Since 1940, farmers in Marshall, Brown, Doniphan, Nemaha, Atchison, Pottawatomie, and Jefferson Counties have organized soil conservation districts. Through the districts they work together for good land use, soil conservation, and soil management.



Emil and Henry Peek of Marshall County are using bromegrass for pasture, hay, seed, and erosion control.



## FACTS ABOUT YOUR LAND WILL HELP YOU

In order to plan your farm for soil conservation farming you need to know exactly what kind of land you have. You need to know where the different kinds are and how much of each kind you have.

Soil scientists are making detailed surveys of farms in the soil conservation districts. They walk over each farm, field by field. They bore holes with an auger or dig them with a spade in order to study the different soil layers and to learn how much soil has washed away. They read slopes with a slope meter. All of these findings and any other important facts about the land are placed on a map of the farm.

From this information your land is classified according to its best use and what it needs to keep it productive. There are six classes of land in your area. Each class is shown by a different color on your conservation-survey map. If you are to get the best returns from your land you will need to use each kind for what it is best suited.

See one of your district supervisors or the technician of the Soil Conservation Service in your district if you want some help on a farm conservation plan. He will tell you if your farm has been mapped and will arrange for someone to talk



The soil conservation surveyor examines the soil, layer by layer, to learn its good and weak points.

with you about a farm conservation plan. If there are a number of applications ahead of you, you may have to wait for your turn.



This terrace has just been built with a two-bottom moldboard plow. The tractor in the background is breaking the land between the terraces.





This grassed waterway will let surplus water get away slowly without making a gully.

## LAND SUITABLE FOR CULTIVATION

All your cropland needs care to keep it productive, regardless of what kind of soil it has, how nearly level the slopes are, or how much it has eroded. These are some of the general practices you will need to use on all your cultivated land.

1. You need to make the soils take up and hold water. This is true particularly on upland soils. Upland soils are usually low in organic matter or humus. You can increase their water-holding capacity by using manure and legumes. You can also leave all straw and stubble on the land and work it into the surface soil. This will help keep the soil fertile as well as let the water in.
2. Farmers practicing conservation in the

area have been seeding waterways to grasses and legumes such as brome grass and alfalfa. The grass prevents ditches in the waterway, and the crop can be used for hay.

3. Lime and fertilize your fields that need it. Tests will show where you can increase crop yields. The soils in the eastern half of the area are more likely to be sour and need lime than those in the western half.
4. Rotate crops and use soil-building legumes. How often to grow row crops, as compared with meadow, depends on the class of land. But the seeding of the land to meadow should be done at regular intervals.

Nitrogen fertilizer will increase the yield of seed and hay on old stands of brome grass. The fertilized area on the right made 273 pounds of seed and 4,600 pounds of hay per acre. The unfertilized area on the left made only 36 pounds of seed and 680 pounds of hay per acre.





# The Best Land to Cultivate

## Class I Land (colored green on your map)

Class I land is nearly level. The soils are deep, dark, and fertile. They do not need drainage or other special practices. Class I land needs only the usual good farming practices such as crop rotations, perhaps fertilizers and lime, and good use of straw, stubble, and manure.

You will find class I land on the well-drained bottoms and second bottoms and the deep level

uplands. It does not erode or overflow. The soils are easy to work.

You can grow all crops common to this area on class I land. These include corn, oats, wheat, alfalfa, sweetclover, soybeans, and sorghums. You can grow fruits and potatoes on the bottom lands in addition to all these crops. Your crop rotation should have a legume or green-manure crop at least once in 5 years.



Class I upland.

Class I bottom land.



## Good Land to Cultivate—Needs Some Care

### Class II Land (colored yellow on your map)

Class II land is suitable for cultivation but is not so easy to farm as class I land. It has minor problems such as erosion or drainage that you

will need to take care of or learn to get along with.

Your area has three kinds of class II land. Let's look at them one at a time.



### *Class II sloping land.*

This is the smooth gently sloping upland throughout the area. The soils are dark and deep but the subsoils are rather heavy. The slope is not more than 5 feet in 100 feet and erosion has not been severe.



Poorly drained class II bottom land. This farmer has put in some small drains to get rid of surplus water.



Gently sloping class II land.

It will grow all the crops common to this area except fruits and vegetables. You will need a good crop rotation that has a legume or green-manure crop at least every 5 years. You will need to farm on the contour and you may need an occasional terrace to break up a long slope. You will also need grassed waterways. Use lime and fertilizer where field tests show that you will get higher yields.

### *Class II flat land needing drainage.*

This is low bottom land near the large streams, mostly in the western part of the area. It needs drainage but it is not hard to drain. The soils are deep and very dark. The subsoils are heavy and do not take water rapidly.

You will need to put in small ditches to carry off surplus water. You may need to build an occasional large terrace to divert runoff water that comes down from higher slopes. Overflowing is not frequent but you may need low dikes to prevent an occasional overflow.

With proper drainage you can grow corn, sorghums, wheat, clover, alfalfa, and brome grass on this land. Alfalfa and sweetclover are helpful in opening up the subsoil.

Because of this they are somewhat droughty and low in fertility. These soils lie along the first bottoms of the Missouri, Kaw, and Blue Rivers.

Sandy soils are fine for fruits and vegetables such as apples, cherries, grapes, raspberries, strawberries, melons, and potatoes. They may also be used for corn, oats, clover, and alfalfa.

You will need to make special effort to keep up the fertility and organic matter in these soils. This means using crop rotations that include a legume at least every 5 years. These soils also need manure and fertilizers if you grow fruits or vegetables.



Grapes and apples on class II sandy land.



# Land That Will Grow Good Crops but Needs Extreme Care

Class III Land (colored red on your map)



Class III land protected by terracing and strip cropping, contouring, and crop rotations. The terrace outlet is being sodded.

Class III land is suitable for cultivation but needs the most careful use of the best soil conservation practices to prevent erosion. Your area has three kinds of class III land:

*Deep, dark uplands with moderately open subsoils.*

These soils will hold lots of moisture. They will produce high yields and are easy to work. This kind of land occurs on slopes of 2 to 9 percent throughout the area. Erosion is a serious problem.

To farm this land safely you will need a good crop rotation that includes a legume at least once each 4 or 5 years. Contour farming and grassed waterways are necessary. You will probably need terraces on most of this land. Other practices



Terracing and contour farming on moderately sloping heavy clay soils to prevent erosion and to let the water soak into the soil. This is class III land.



This farmer seeded this eroded, sloping class III land to brome grass and alfalfa. The clear pond in the background will not silt up as long as the grass remains.





This farmer planted his orchard on the contour on moderately deep, sloping class III land.

you will probably need are liming where tests show the need, and fertilizing legumes, grasses, and small grains. Strip cropping may be better than terracing on some of the slopes. This land will grow all the crops common to this area.

*Moderately deep upland soils with open subsoils.*

You will find this class III land on slopes up to 10 percent in the eastern third of Doniphan, Atchison, Leavenworth, and Wyandotte Counties. This land is not so deep or dark as the land just described and does not hold moisture so well. It usually needs lime to grow legumes. It will grow corn, small grain, legumes, grasses, fruits, and vegetables. You will need to use all the conservation practices recommended on the darker class III land and will need to put special emphasis on building up the organic matter. This means saving all straw, stubble, manure, and other residues.

*Sandy upland soils on gentle slopes.*

The problem here is to keep up fertility, hold moisture, and control moderate erosion. You will find this kind of land near the Kaw and the Blue Rivers. It is good for fruits, vegetables, sorghums, legumes, and grasses. You will need all the soil-saving practices that are recommended on the dark-colored class III land with special emphasis on legumes and green-manure crops.



Class III land strip cropped to corn and oats. At least one-fourth of the land is kept in a close-growing crop.



# LAND SUITED FOR ONLY LIMITED CULTIVATION

## Fairly Good Land Best Suited to Pasture or Hay

Class IV Land (colored blue on your map)



This class IV land on a steep slope has lost a lot of soil by erosion. Although the soil is moderately deep and open, without a protective cover of grass it was not able to withstand the effects of heavy rains.

Class IV land is harder to farm than class III. Even though you use every possible precaution, this land will wash if cropped regularly. The slopes are as steep as 18 percent and erosion will be severe unless the land is kept in close-growing vegetation most of the time.

The best use for this land is hay or pasture. An occasional crop of small grain or perhaps a row crop may be grown if you need to reestablish the grass. All farming operations should be done on the contour. You may need diversion terraces and strip cropping on some class IV land. If you must plow class IV land, lift the plow when crossing waterways. This land also needs lime and fertilizer according to test. Three general kinds of land make up class IV.

*Severely eroded, deep, dark soils on moderate slopes.*

This land occurs all over the area. The slope ranges from 3 to 10 percent. Cropping has led to serious loss of soil. The best use of this land is



hay or pasture. It is not good land for row crops. An occasional crop of small grain may be grown when reseeding the meadow.

*Moderately eroded dark soils on steep slopes.*

This land slopes from 10 to 18 percent. It has been kept in grass for the most part and therefore is not badly eroded. You will find most of this land on the rolling hills near the Missouri, Kaw, and Blue Rivers. In addition to hay and small grain, orchards and berries do well on this land. By planting the orchard on the contour other farming operations such as plowing under green-manure crops are more easily done on the contour.

*Deep soils on gentle slopes along the narrow streams.*

These soils are subject to severe gully erosion if cultivated. They are not good for small grains because the grain usually lodges or is damaged by flooding. The best use for this land is for pasture, legumes for hay, or orchards and berries. It may be worth while in some places to build small dams in the gullies.



Class IV bottom land in Atchison County. Narrow bottom areas like this tend to form gullies unless protected by grass.

Eroded class IV land in Doniphan County that was contoured before it was seeded to brome grass and alfalfa.



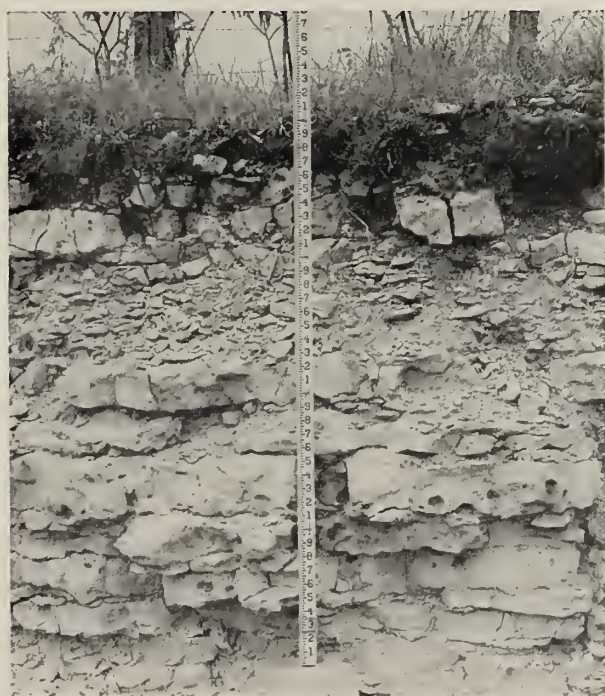
# LAND NOT SUITABLE FOR CULTIVATION

## Good Land for Grass or Trees—Needs Some Care

Class VI Land (colored orange on your map)



Class VI land that is moderately sloping and severely eroded. It should be seeded to grass.



Shallow, stony class VI land that is unsuitable for cultivation but makes good grassland.

Class VI land is not suitable for cultivation. It may be used for pasture or trees but it needs to be carefully handled. Class VI land consists of shallow stony or gravelly soils, steep hilly soils, gently sloping land that is severely eroded, and rough broken land.

In order to grow good pasture, use legumes in the seed mixture. Use lime and fertilizer to give the young plants a good start. You may need to build some diversion terraces around the heads of active gullies. It may be best to fence out the large gullies. You may need to do some spot sodding in waterways where a gully is starting to form. Do not graze the new pasture until it becomes well established. On old pastures it is best to keep stock off the pasture for 3 or 4 weeks after growth starts in the spring.

Mow weeds once or twice each summer where the land is level enough for using a mower.

For more specific information on seeding and managing pastures see the technician assigned to your soil conservation district or your county agent.



## Land That May Be Used for Grass or Trees but Must Be Handled Very Carefully

Class VII Land (colored brown on your map)



Steep eroded land like this should be kept in grass or trees. This is class VII land.



A large gully in Marshall County. Areas like this are placed in class VII.

Class VII land is even more limited in its uses than class VI. Class VII land consists of large gullies or land cut up by gullies, very steep land, and low-lying overflow land. Riverwash is also class VII land.

The gullied land is best used for trees. Plant trees that do well locally, such as walnut, oak, elm, cottonwood, osage orange, and hackberry. Some of the steep land may be used for pasture but needs very careful management. The low-lying overflow land is more suited to trees than to any other use.

The district technician can help you select the right kind of trees for your class VII land.

All class VI and class VII land that is to be used for woodland should be fenced to keep out livestock and should be protected from fire.





A farm pond that is well protected from silt. It will furnish good livestock water and food for fish. The garden below the dam is irrigated from this pond.

## KINDS OF LAND IN NORTHEASTERN KANSAS

Detailed farm maps have been made on 875,000 acres of land in northeastern Kansas. The following information is based on these surveys:

### Land Suited for Regular Cultivation:

#### Class I Land:

	<i>Acres</i>	<i>Percent</i>
Very good land that can be farmed safely with ordinary good farming methods.....	94, 000	3

#### Class II Land:

Good land that can be cultivated safely with easily applied soil conservation practices. Needs contouring, perhaps terracing or other easily applied practices.....	286, 000	8
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#### Class III Land:

Moderately good land that can be cultivated safely with intensive use of soil conservation practices. Needs terracing, strip cropping, waterways, and other practices.....	2, 045, 000	61
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Total land suited for cultivation.....	2, 425, 000	72
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### Land Suited for Limited Cultivation:

#### Class IV Land:

	<i>Acres</i>	<i>Percent</i>
Fairly good land that is best suited to hay or pasture but can be cultivated occasionally.....	352, 000	11

Total land suited for limited cultivation.....	352, 000	11
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### Land Not Suited for Cultivation:

#### Class VI Land:

Needs protective measures to be used for pasture.....	551, 500	16
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#### Class VII Land:

Suited for grass or trees but needs extreme care to prevent erosion.....	29, 800	1
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Total land not suited for cultivation.....	581, 300	17
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Making lumber from your native trees is a profitable spare-time job.



# HOW ONE FARMER PLANNED HIS FARM TO FIT THE LAND

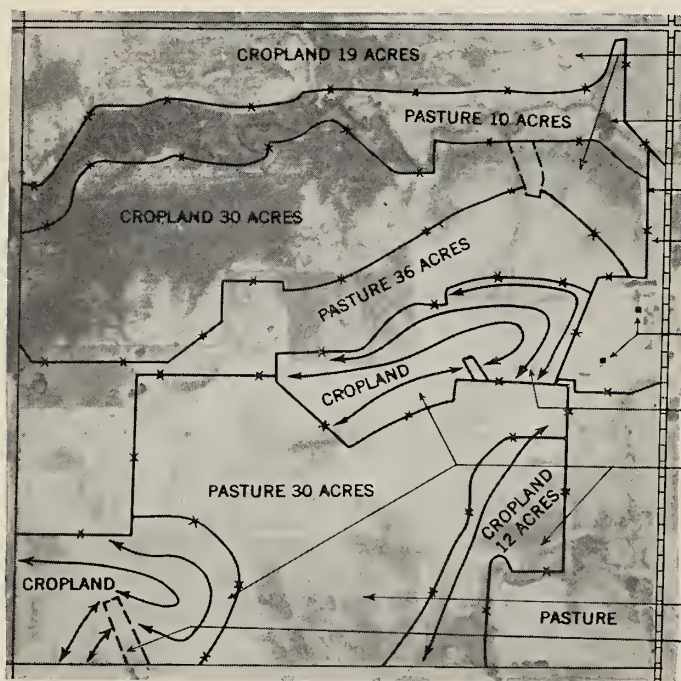
This is the kind of land he has:



## Land-capability classes

- Class I.—Level, deep, fertile bottom land. Needs no special practices. Very good cropland.
- Class VI.—Rough gullied land. Good for pasture or trees. Needs protection from overuse.
- Class IV.—Dark soil on 10- to 16-percent slope. Tight red subsoil. Nearly three-fourths of topsoil gone. Gullied. Best use is hay or pasture.
- Class VI.—Steep land, over 16-percent slope. Few gullies. Shallow gravelly soil. Good grassland but should be pastured with care.
- Class III.—Dark productive soil on 7-percent slope. Half or more of the topsoil gone. Can be cultivated but needs extreme care.
- Class II.—Dark upland soil on 4-percent slope. Slight erosion, no gullies. Open subsoil. Can be cultivated safely with easily applied practices. Good cropland.
- Class VI.—Rough gullied land. Good for pasture or trees. Needs protection from overuse.
- Class II.—Slightly gullied bottom land. Needs some protection to be cultivated.
- Class VI.—Dark soil on 10- to 16-percent slope. Tight red subsoil. Nearly all topsoil gone. Gullied. Best use is pasture. Needs protection from overgrazing.
- Class IV.—Dark soil on 10- to 16-percent slope. Tight red subsoil. Nearly three-fourths of topsoil gone. Gullied. Best use is hay or pasture.
- Class I.—Level, deep, fertile upland. Will not wash under good management. Needs no special practices. Very good cropland.

This is his new farm plan:



- These level fields will be cultivated without special practices.
- Rough land along the streams is fenced out and used for pasture.
- Fence.
- Lane leading from lots to pasture.
- Farm buildings.
- Terraces.
- Cropland fields that will be terraced and farmed with legumes in the crop rotation.
- This steep eroded field was seeded and converted to pasture.
- Grassed waterway to carry off water from terraces.

This farmer is also:

1. Controlling burning
2. Planting legumes
3. Using fertilizer and manure
4. Farming on the contour
5. Planting green-manure crops
6. Using crop stubble



## WHAT YOU CAN DO TO START CONSERVATION

1. Seed waterways to grass at least 3 rods wide.
2. Take steep and eroded land out of crops. Plant it to grass.
3. Plant grass or trees in gullies.
4. Use fertilizer on poor land.
5. Plant more legumes.
6. Rotate crops.
7. Farm across the slope.
8. Protect crop stubble, pastures, or wooded areas from burning.
9. Use all manure.
10. Keep livestock out of gullies so grass can grow.
11. Mow weedy or brushy pastures.
12. Fence eroded areas.
13. Plant permanent hay.
14. Protect good birds and animals.
15. Plow under green-manure crops.
16. Return to the land as much as you take out.

## WHAT YOUR SOIL CONSERVATION DISTRICT CAN DO TO HELP YOU

1. Help you make a farm conservation plan that will enable you to use your land better.
2. Recommend crops for your land.
3. Give you a map of your farm showing the kinds of land you have.
4. Lay out terraces and diversions.
5. Show you how to build terraces.
6. Check your terraces for construction.
7. Help you decide the kind of crops to grow and where to plant them.
8. Lay out contour farming lines.
9. Help you lay out fields on the contour.
10. Survey a site for farm pond and check your construction.
11. Help you locate and plan a windbreak.

# FLOODS AND FLOOD CONTROL—A COMMUNITY PROBLEM



Floods are a vital problem in northeastern Kansas. Along the Missouri River in Doniphan County alone the Army engineers made the following report: "Over 37,000 acres have been flooded in some years, which amounted to an estimated crop loss of \$421,000 in 1942, \$294,710 in 1943, and \$154,823 in 1944. In 1942 the damage to crops, livestock, equipment, and farm buildings was estimated at \$430,000 for Doniphan County." These figures do not include damage along the small streams. Every year farmers lose crops on bottom land along the Blue, Kaw, Delaware, Vermillion, and smaller streams throughout the area. No accurate figures are available on this damage but we know it amounts to millions of dollars every year.

It is true that floods occurred before the land was settled. But by plowing up and overgrazing

the grasslands, logging off timber, burning brush, and cultivating sloping land we have speeded up the runoff of surplus water. The large amount of soil carried to the streams has added to the flood problem by filling stream channels.

The soil washed from the land is sorted by the flood waters. The infertile coarse particles of sand and gravel are dropped in or near the stream channels; the finest soil particles with the most fertility are lost to the ocean.

Farmers who are practicing soil conservation on their farms are helping to reduce floods. All soil conservation practices such as terracing, contouring, strip cropping, and crop rotations help hold the water where it falls. That which must run off does so more slowly and carries less soil with it. Not only are floods reduced but dams and reservoirs are protected from silting.